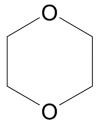
Office of Chemical Safety and Pollution Prevention

# Risk Evaluation for 1,4-Dioxane

# **Systematic Review Supplemental File:**

# **Data Quality Evaluation of Environmental Hazard Studies**

CASRN: 123-91-1



June 2019

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8	3661129	Aquatic Vertebrates	R. Johnson, J. Tietge, G. Stokes, D. Lothenbach. 1993. The Medaka Carcinogenesis Model.	15	
9	4158026	Aquatic Vertebrates	Dow Chemical. 1989. 1,4-Dioxane: Embryo-larval toxicity test with the Fathead minnow, <i>Pimephales promelas</i> Ra nesque.	17	
12	4438934	Aquatic Plants	G. Bringman, R. Kuhn. 1977. Limiting values of the harmful action of water endangering substances on bacteria ( <i>Pseudomonas putida</i> ) and green algae ( <i>Scenedesmus quadricauda</i> ) in the cell multiplication inhibition test. Zeitschrift fuer Wasser- und Abwasser-Forschung 10:87-98	19	

Study Citation:	,	. W., Jennings, A. L., Drozdowski, D., Rider, E	1977. The	acute to	xicity o	f 47 industrial chemicals to fresh and saltwater			
Data Type:	fishes. Journal of Hazardous Materials 1:303-318 Acute (0-96 hour); Aquatic; Fish								
Hero ID:	18670	nour), Aquatic, Fish							
	10070								
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	Comments <sup>††</sup>			
Domain 1: Test S	Substance								
	Metric 1:	Test Substance Identity	High	$\times 2$	2				
	Metric 2:	Test Substance Source	Low	$\times 1$	3	Test source was not reported.			
	Metric 3:	Test Substance Purity	Low	× 1	3	The test purity was not reported.			
Domain 2: Test l	Design								
	Metric 4:	Negative Controls	High	$\times 2$	2				
	Metric 5:	Negative Control Response	High	$\times 1$	1				
	Metric 6:	Randomized Allocation	Medium	× 1	2	Not specified, the information was implied for this metric.			
D : 9 E	CI. 4								
Domain 3: Expos			Т	v. 0	c	1			
	Metric 7:	Experimental System/Test Media Preparation	Low	$\times 2$	6	limited information provided			
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1				
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1				
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	Information was provided for this metric.			
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	No information was reported; however, an LC50 was derived.			
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1				
Domain 4: Test	Organism								
Domain 4. 1est	Metric 13:	Test Organism Characteristics	High	$\times$ 2	2				
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\stackrel{\wedge}{\times} \stackrel{2}{1}$	1				
	Metric 15:	Number of Organisms and Replicates per	Medium	× 1	2	Limited info provided			
	1.100110 10.	Group		,, <u>+</u>	-				
	Metric 16:	Adequacy of Test Conditions	High	× 1	1				
Domain 5: Outco	ome Assessme	ant							
Domain o. Outco	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2				
	Metric 18:	Consistency of Outcome Assessment	High	$\times$ 2 $\times$ 1	1				
		<u> </u>	0						
		Continued on next page							

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Study Citation:	Dawson, G. W., Jennings, A. L., Drozdowski, D., Rider, E 1977. The acute toxicity of 47 industrial chemicals to fresh and saltwater fishes. Journal of Hazardous Materials 1:303-318							
Data Type: Hero ID:		hour); Aquatic; Fish						
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$		
Domain 6: Confo	ounding / Var	riable Control						
Domain o. Come	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2	Information was reported for this metric.		
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1			
Domain 7: Data	Presentation	and Analysis						
	Metric 21:	Statistical Methods	High	$\times 1$	1			
	Metric 22:	Reporting of Data	High	$\times 2$	2			
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A			
Overall Quality I	Determination	n <sup>‡</sup>	High		1.4			
Extracted			No					

 $<sup>\</sup>star$  MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

where High = 21 to < 1.7; Medium = 21.7 to < 2.3; Low = 2.3 to < 3.1 If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

2

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

Study Citation:	G. Bringmann, R. Kuehn. 1982. Ergebnisse der Schadwirkung wassergefaehrdender Stoffe gegen Daphnia magna in einem weiterentwickelten standardisierten Testverfahren [Results of toxic action of water pollutants on Daphnia magna Straus tested by an improved standardized procedure]. Wasser und Abwasser in Forschung und Praxis 15							
Data Type: Hero ID:		5 hour); Aquatic; Invertebrates						
Domain		Metric	Rating <sup>†</sup>	$\mathrm{MWF}^{\star}$	Score	$Comments^{\dagger\dagger}$		
Domain 1: Test S	Substance							
	Metric 1:	Test Substance Identity	Low	$\times 2$	6	Only the chemical name was provided.		
	Metric 2:	Test Substance Source	Low	$\times$ 1	3	The source of the chemical was not reported		
	Metric 3:	Test Substance Purity	Low	× 1	3	The information for this metric was provided in the report.		
Domain 2: Test l	Design							
	Metric 4:	Negative Controls	High	$\times 2$	2			
	Metric 5:	Negative Control Response	High	$\times 1$	1			
	Metric 6:	Randomized Allocation	High	× 1	1			
Domain 3: Expos	sure Characte	erization						
•	Metric 7:	Experimental System/Test Media Preparation	High	$\times$ 2	2			
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1			
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	The information for this metric was provided in the report.		
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2			
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1			
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1			
Domain 4: Test (	Organism							
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2			
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times$ 1	1			
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1			
	Metric 16:	Adequacy of Test Conditions	High	× 1	1			
Domain 5: Outco	ome Assessme	ent						
	Metric 17:	Outcome Assessment Methodology	High	$\times$ 2	2			
		Continued on next page						

G. Bringmann, R. Kuehn. 1982. Ergebnisse der Schadwirkung wassergefaehrdender Stoffe gegen Daphnia magna in einem weiteren-

Outcomes Unrelated to Exposure

Domain 7:	Data	Presentation	and.	Analysis
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Metric 20:

Domain 7: Data Presentation and Analysis										
Metric 21:	Statistical Methods	Medium	$\times$ 1	2	Limited information was provided for this metric.					
Metric 22:	Reporting of Data	High	$\times 2$	2						
Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A						
Overall Quality Determination <sup>‡</sup>				1.3						

N/A

Yes

N/A

\* MWF = Metric Weighting Factor

Extracted

Study Citation:

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

Procedures

<sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.$$

where High= $\geq 1$  to < 1.7; Medium= $\geq 1.7$  to < 2.3; Low= $\geq 2.3$  to <= 3. If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† This metric met the criteria for high confidence as expected for this type of study.

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Data	Type:

Study Citation:

G. Bringmann, R. Kuhn. 1978. Grenzwerte der Schadwirkung wassergefahrdender Stoffe gegen Blaualgen (Microcystis aeruginosa) und Grunalgen (Scenedesmus quadricauda) im Zellvermehrungshemmtest [Limiting values for the noxious effects of water pollutant material to blue algae (Microcystis aeruginosa) and green algae (Scenedesmus quadricauda) in cell propagation inhibition tests].. Vom

Wasser 50:45-60

Other; Aquatic; Plants

Hero ID: 51735

Metric	$\mathrm{Rating}^{\dagger}$	$\mathbf{MWF}^{\star}$	Score	$\mathrm{Comments}^{\dagger\dagger}$
Consistency of Outcome Assessment	High	× 1	1	
able Control				
Confounding Variables in Test Design and	$\operatorname{High}$	$\times 2$	2	
Procedures				
Outcomes Unrelated to Exposure	High	$\times$ 1	1	
and Analysis				
·	Medium	× 1	2	Limited information was provided for this metric.
	High			
Explanation of Unexpected Outcomes	N/A		N/A	
	·		·	
Overall Quality Determination <sup>‡</sup>			1.3	
	Ves			
3	Consistency of Outcome Assessment  able Control Confounding Variables in Test Design and Procedures Outcomes Unrelated to Exposure  and Analysis Statistical Methods Reporting of Data Explanation of Unexpected Outcomes	Consistency of Outcome Assessment High  able Control Confounding Variables in Test Design and High Procedures Outcomes Unrelated to Exposure High  and Analysis Statistical Methods Medium Reporting of Data High Explanation of Unexpected Outcomes N/A	Consistency of Outcome Assessment High × 1  able Control Confounding Variables in Test Design and High × 2 Procedures Outcomes Unrelated to Exposure High × 1  and Analysis Statistical Methods Medium × 1 Reporting of Data High × 2 Explanation of Unexpected Outcomes N/A  High	Consistency of Outcome Assessment High × 1 1  able Control Confounding Variables in Test Design and High × 2 2 Procedures Outcomes Unrelated to Exposure High × 1 1  and Analysis Statistical Methods Medium × 1 2 Reporting of Data High × 2 2 Explanation of Unexpected Outcomes N/A N/A  High 1.3

 $<sup>\</sup>star$  MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ & \\ \left\lfloor \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

where  $\text{High} = \geq 1$  to < 1.7;  $\text{Medium} = \geq 1.7$  to < 2.3;  $\text{Low} = \geq 2.3$  to <= 3. If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

Study Citation:	G. Bringma 10:161-166	nn, R. Kuhn. 1977. The effects of water pollu	itants on	Daphnia	magna.	Wasser und Abwasser in Forschung und Praxis
Data Type: Hero ID:	Acute (0-96 73652	hour); Aquatic; Invertebrates				
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	Low	$\times$ 2	6	No chemical identity information was provided for any of the chemicals including 1,4-Dioxane in this report. Only the chemical names were provided.
	Metric 2:	Test Substance Source	Low	× 1	3	The report source did not provide any information about the manufacturer of the chemicals tested.
	Metric 3:	Test Substance Purity	Low	× 1	3	Information about the purity was not provided.
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Expos	sure Characte	erization				
zomem or zarpos	Metric 7:	Experimental System/Test Media Preparation	High	$\times$ 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times$ 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	No information was provided for this metric.
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	$\times$ 1	1	
Domain 4: Test (	Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	$\times$ 1	1	
Domain 5: Outco	ome Assessme	ent				
		Continued on next page				

Study Citation:	on: G. Bringmann, R. Kuhn. 1977. The effects of water pollutants on Daphnia magna. Wasser und Abwasser in Forschung und Pra 10:161-166							
Data Type:	Acute (0-96	hour); Aquatic; Invertebrates						
Hero ID:	73652	,						
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$		
	Metric 17:	Outcome Assessment Methodology	High	$\times$ 2	2	This metric was completely characterized.		
	Metric 18:	Consistency of Outcome Assessment	High	$\times$ 1	1			
Domain 6: Confo	ounding / Var	riable Control						
	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2			
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1			
Domain 7: Data	Presentation	and Analysis						
	Metric 21:	Statistical Methods	Low	$\times$ 1	3	No statistical methods were provided.		
	Metric 22:	Reporting of Data	High	$\times 2$	2	•		
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A			
Overall Quality I	Determination	ı‡	High		1.4			
Extracted			Yes					

 $<sup>\</sup>star$  MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left[ \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise}$$

where High = 21 to < 1.7; Medium = 21.7 to < 2.3; Low = 2.3 to < 3.1 If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

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<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

#### ... continued from previous page

Study Citation:		nn, R. Kuehn. 1982. Results of Toxic Actioned Procedure. 15:1-6(GER) (ENG ABS) (OECI			ants on	Daphnia magna Straus Tested by an Improved
Data Type: Hero ID:		hour); Aquatic; Invertebrates	og Data 1	r ne)		
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	Comments <sup>††</sup>
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	N/A		N/A	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ome Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confe	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	This information was reported for this metric.
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	Low	$\times$ 1	3	Limited information was provided for this metric. Only effects results were reported.
	Metric 22:	Reporting of Data	High	$\times 2$	2	
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A	
Overall Quality l	Determination	<sup>‡</sup>	High		1.4	
Extracted			Yes			

 $<sup>^{\</sup>star}$  MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \left[ \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.$$

where High = 21 to < 1.7; Medium = 21.7 to < 2.3; Low = 2.3 to < 3.1 If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

Study Citation:								
D / T	Amphipod and a Cladoceran.  Acute (0-96 hour); Aquatic; other Fish and Daphnia							
Data Type:	,	o nour); Aquatic; other Fish and Daphnia						
Hero ID:	3634436							
Domain		Metric	Rating <sup>†</sup>	$\mathrm{MWF}^{\star}$	Score	Comments <sup>††</sup>		
Domain 1: Test S	Substance							
	Metric 1:	Test Substance Identity	High	$\times$ 2	2			
	Metric 2:	Test Substance Source	High	$\times$ 1	1			
	Metric 3:	Test Substance Purity	High	× 1	1			
Domain 2: Test l	Design							
	Metric 4:	Negative Controls	High	$\times 2$	2			
	Metric 5:	Negative Control Response	High	$\times$ 1	1			
	Metric 6:	Randomized Allocation	High	× 1	1			
Domain 3: Expos	sure Characte	erization						
·	Metric 7:	Experimental System/Test Media Preparation	High	$\times$ 2	2			
	Metric 8:	Consistency of Exposure Administration	High	$\times$ 1	1			
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1			
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2			
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	$\times$ 1	1			
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1			
Domain 4: Test 0	Organism							
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2			
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times$ 1	1			
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1			
	Metric 16:	Adequacy of Test Conditions	High	× 1	1			
Domain 5: Outco	ome Assessme	ent						
3. 3. 3. 3.	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
		Continued on next page						

Study Citation:	Brooke, L 1987. Report of the Flow-Through and Static Acute Test Comparisons with Fathead Minnows and Acute Tests with an Amphipod and a Cladoceran.								
Data Type:	Acute (0-96 hour); Aquatic; other Fish and Daphnia								
Hero ID:	3634436	,, .							
Domain		Metric	Rating <sup>†</sup>	$\mathrm{MWF}^{\star}$	Score	$Comments^{\dagger\dagger}$			
Domain 6: Confo	Domain 6: Confounding / Variable Control								
	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	$\times$ 1	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A				
Overall Quality I	Overall Quality Determination <sup>‡</sup>		High		1.0				
Extracted			Yes						

<sup>\*</sup> MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left[ \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

where High = 21 to < 1.7; Medium = 21.7 to < 2.3; Low = 2.3 to < 3.1 If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

v	Geiger, D. I V.	L.,Brooke, L. T.,Call, D. J 1990. Acute toxiciti	es of orgai	nic chem	icals to fathead	minnows (Pimephales promelas): Volum
Data Type: Hero ID:		hour); Aquatic; Fish				
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	$\times 1$	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times$ 1	1	
	Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Expos	sure Characte	erization				
•	Metric 7:	Experimental System/Test Media Preparation	High	$\times$ 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times$ 1	1	
	Metric 9:	Measurement of Test Substance Concentration	High	$\times$ 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test C	Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times$ 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ome Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times$ 2	2	
	Metric 18:	Consistency of Outcome Assessment	High	$\times$ 1	1	

Study Citation:	Geiger, D. L., Brooke, L. T., Call, D. J 1990. Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas): Volume V.						
Data Type: Hero ID:		hour); Aquatic; Fish					
Domain		Metric	Rating <sup>†</sup>	$\mathrm{MWF}^{\star}$	Score	${\rm Comments}^{\dagger\dagger}$	
Domain 6: Confo	ounding / Var	iable Control					
	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2		
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data	Presentation	and Analysis					
	Metric 21:	Statistical Methods	High	$\times 1$	1		
	Metric 22:	Reporting of Data	High	$\times 2$	2		
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A		
Overall Quality Determination <sup>‡</sup>		High		1.0			
Extracted			Yes				

 $<sup>^{\</sup>star}$  MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \left[ \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

where High = 21 to < 1.7; Medium = 21.7 to < 2.3; Low = 2.3 to < 3.1 If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

Data Type:	R. Johnson, J. Tietge, G. Stokes, D. Lothenbach. 1993. The Medaka Carcinogenesis Model. Chronic (>21 days); Aquatic; Fish 3661129							
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	$Comments^{\dagger\dagger}$		
Domain 1: Test Su	ubstance							
	Metric 1:	Test Substance Identity	High	$\times 2$	2	The chemical identity was provided in this study.		
	Metric 2:	Test Substance Source	Low	$\times 1$	3	The manufacturer was not provided.		
	Metric 3:	Test Substance Purity	Low	× 1	3	The purity was not provided for this study.		
Domain 2: Test De	esign							
	Metric 4:	Negative Controls	High	$\times 2$	2			
	Metric 5:	Negative Control Response	High	$\times$ 1	1			
	Metric 6:	Randomized Allocation	High	$\times$ 1	1			
Domain 3: Exposu	ıre Characte	erization						
_	Metric 7:	Experimental System/Test Media Preparation	High	$\times$ 2	2			
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1			
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Other chemicals were tested. This could have affected the choice for not providing this information.		
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2			
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	Limited information was provided.		
	Metric 12:	Testing at or Below Solubility Limit	N/A		N/A	This test substance is very soluble.		
Domain 4: Test O	rganism							
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2			
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times$ 1	1			
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1			
	Metric 16:	Adequacy of Test Conditions	High	$\times$ 1	1			
Domain 5: Outcon	ne Assessme	ent						
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
Domain 6: Confou	ınding / Var	riable Control						
	- 1	Continued on next page						

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Study Citation: Data Type: Hero ID:		R. Johnson, J. Tietge, G. Stokes, D. Lothenbach. 1993. The Medaka Carcinogenesis Model. Chronic (>21 days); Aquatic; Fish 3661129							
Domain		Metric	$\mathrm{Rating}^{\dagger}$	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	This endpoint is well characterized.			
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	$\times$ 1	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A				
Overall Quality Determination <sup>‡</sup>		High		1.2					
Extracted			Yes						

<sup>\*</sup> MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

where High= $\geq$  1 to < 1.7; Medium = $\geq$  1.7 to < 2.3; Low = $\geq$  2.3 to <= 3. If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

Study Citation: Data Type: Hero ID:	Dow Chemical. 1989. 1,4-Dioxane: Embryo-larval toxicity test with the Fathead minnow, Pimephales promelas Rafinesque. Acute (0-96 hour); Aquatic; Fish 4158026							
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$		
Domain 1: Test S	Substance							
	Metric 1:	Test Substance Identity	High	$\times 2$	2			
	Metric 2:	Test Substance Source	High	$\times$ 1	1			
	Metric 3:	Test Substance Purity	High	× 1	1			
Domain 2: Test I	Design							
	Metric 4:	Negative Controls	High	$\times 2$	2			
	Metric 5:	Negative Control Response	High	$\times 1$	1			
	Metric 6:	Randomized Allocation	High	× 1	1			
Domain 3: Expos	sure Characte	erization						
1	Metric 7:	Experimental System/Test Media Preparation	High	$\times$ 2	2			
	Metric 8:	Consistency of Exposure Administration	High	$\times$ 1	1			
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1			
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2			
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1			
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	The information was provided for this metric.		
Domain 4: Test (	Organism							
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2			
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times$ 1	1			
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1			
	Metric 16:	Adequacy of Test Conditions	High	× 1	1			
Domain 5: Outco	ome Assessme	ent						
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	The information was provided for this metric.		
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
Domain 6: Confo	unding / Var	riable Control						
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Study Citation: Data Type: Hero ID:		Dow Chemical. 1989. 1,4-Dioxane: Embryo-larval toxicity test with the Fathead minnow, Pimephales promelas Rafinesque. Acute (0-96 hour); Aquatic; Fish 4158026							
Domain		Metric	Rating <sup>†</sup>	$\mathrm{MWF}^{\star}$	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	$\times$ 1	1				
Domain 7: Data		v							
	Metric 21:	Statistical Methods	$\operatorname{High}$	$\times 1$	1				
	Metric 22:	Reporting of Data	$\operatorname{High}$	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A				
Overall Quality Determination <sup>‡</sup>		High		1.0					
Extracted			Yes						

<sup>\*</sup> MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

where  $\text{High} \ge 1 \text{ to} < 1.7$ ;  $\text{Medium} = \ge 1.7 \text{ to} < 2.3$ ;  $\text{Low} = \ge 2.3 \text{ to} < = 3$ . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.

Study Citation:	: G. Bringman, R. Kuhn. 1977. Limiting values of the harmful action of water endangering substances on bacteria (Pseudomonas putida and green algae (Scenedesmus quadricauda) in the cell multiplication inhibition test. Zeitschrift fuer Wasser- und Abwasser-Forschur 10:87-98							
Data Type: Hero ID:	Other; Aqu 4438934	atic; Plants						
Domain		Metric	$\mathrm{Rating}^{\dagger}$	$\mathrm{MWF}^{\star}$	Score	${\rm Comments}^{\dagger\dagger}$		
Domain 1: Test S	Substance							
	Metric 1:	Test Substance Identity	Low	$\times 2$	6	Only the chemical name was provided for this study.		
	Metric 2:	Test Substance Source	Low	$\times 1$	3	The source was not reported.		
	Metric 3:	Test Substance Purity	Low	× 1	3	The test purity was not reported.		
Domain 2: Test I	Design							
	Metric 4:	Negative Controls	High	$\times 2$	2			
	Metric 5:	Negative Control Response	High	$\times 1$	1			
	Metric 6:	Randomized Allocation	High	× 1	1			
Domain 3: Expos	sure Characte	erization						
Domain o. Expos	Metric 7:	Experimental System/Test Media Preparation	High	$\times$ 2	2			
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1			
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1			
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2			
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1			
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1			
Domain 4: Test (	Iraaniem							
Domain 4. 1650 C	Metric 13:	Test Organism Characteristics	High	$\times 2$	2			
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1			
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1			
	Metric 16:	Adequacy of Test Conditions	High	× 1	1			
Domain 5: Outco	me Assessme	ont						
Domain 5. Outco	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2			
	Metric 17:	Consistency of Outcome Assessment	High	× 1	1			
		Continued on next page	<u> </u>					

Study Citation:	and green a 10:87-98	G. Bringman, R. Kuhn. 1977. Limiting values of the harmful action of water endangering substances on bacteria (Pseudomonas putida) and green algae (Scenedesmus quadricauda) in the cell multiplication inhibition test. Zeitschrift fuer Wasser- und Abwasser-Forschung 10:87-98 Other; Aquatic; Plants								
Data Type: Hero ID:	4438934	atic; Fiants								
Domain		Metric	Rating <sup>†</sup>	MWF*	Score	$Comments^{\dagger\dagger}$				
Domain 6: Confo	ounding / Vai	riable Control								
	Metric 19:	Confounding Variables in Test Design and Procedures	High	$\times$ 2	2					
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1					
Domain 7: Data	Presentation	and Analysis								
	Metric 21:	Statistical Methods	High	$\times$ 1	1					
	Metric 22:	Reporting of Data	Medium	$\times 2$	4	Limited information was provided for this metric.				
	Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A					
Overall Quality I	Overall Quality Determination <sup>‡</sup>				1.3					
Extracted			Yes							

 $<sup>\</sup>star$  MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left[ \sum_{i} \left( \text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.$$

where High= $\geq$  1 to < 1.7; Medium = $\geq$  1.7 to < 2.3; Low = $\geq$  2.3 to <= 3. If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

<sup>†</sup> High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

<sup>&</sup>lt;sup>‡</sup> The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

<sup>††</sup> This metric met the criteria for high confidence as expected for this type of study.